

University of Groningen

Chain length dependence of the helix orientation in Langmuir-Blodgett monolayers of alpha-helical diblock copolypeptides

Nguyen, Le-Thu T.; Ardana, Aditya; Vorenkamp, Eltjo J.; ten Brinke, Gerrit; Schouten, Arend J.

Published in:
Soft Matter

DOI:
[10.1039/c001163k](https://doi.org/10.1039/c001163k)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2010

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Nguyen, L-T. T., Ardana, A., Vorenkamp, E. J., ten Brinke, G., & Schouten, A. J. (2010). Chain length dependence of the helix orientation in Langmuir-Blodgett monolayers of alpha-helical diblock copolypeptides. *Soft Matter*, 6(12), 2774-2785. <https://doi.org/10.1039/c001163k>

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Chain length dependence of the helix orientation in Langmuir-Blodgett monolayers of α -helical diblock copolypeptides

*Le-Thu T. Nguyen, Aditya Ardana, Eltjo J. Vorenkamp, Gerrit ten Brinke, and Arend J. Schouten**

Department of Polymer Chemistry, Zernike Institute for Advanced Materials, University of Groningen,
Nijenborgh 4, 9747 AG Groningen, The Netherlands

* Corresponding author. E-mail address: A.J.Schouten@rug.nl

SUPPLEMENTARY INFORMATION

Transmission FT-IR spectra

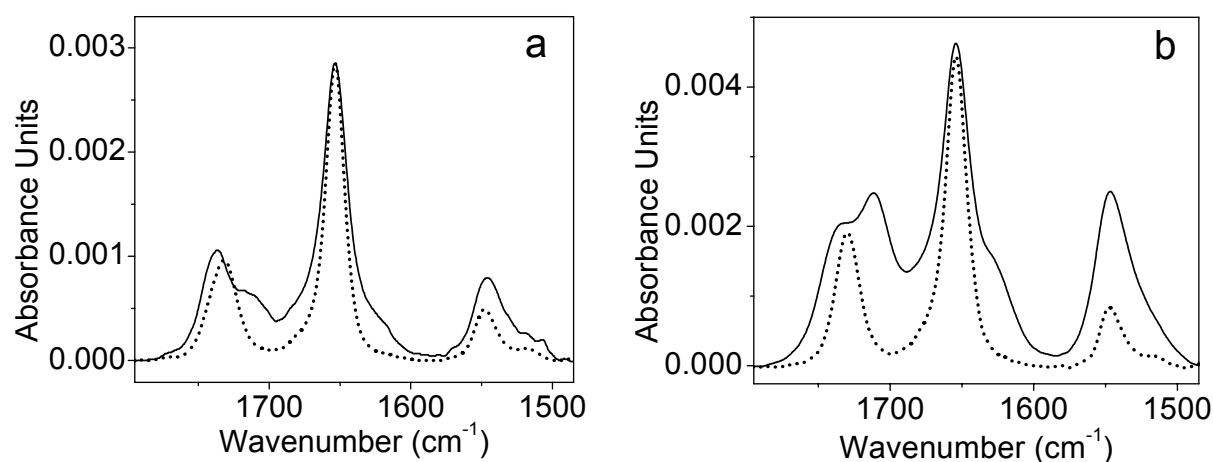


Figure 1. (a) Transmission FT-IR spectra of the LB monolayer of CoPo_63_39 deposited at 40 mN/m (solid line) and the LB film of (tBuLG)₆₃-*b*-(MLGSLG)₃₉ deposited at 20 mN/m (2 layers on each side of the silicon substrate, dotted line); (b) transmission FT-IR spectra of the LB monolayer of CoPo_50_11 deposited at 40 mN/m (solid line) and the LB film of (tBuLG)₅₀-*b*-(MLGSLG)₁₁ deposited at 20 mN/m (4 layers on each side of the silicon substrate, dotted line).

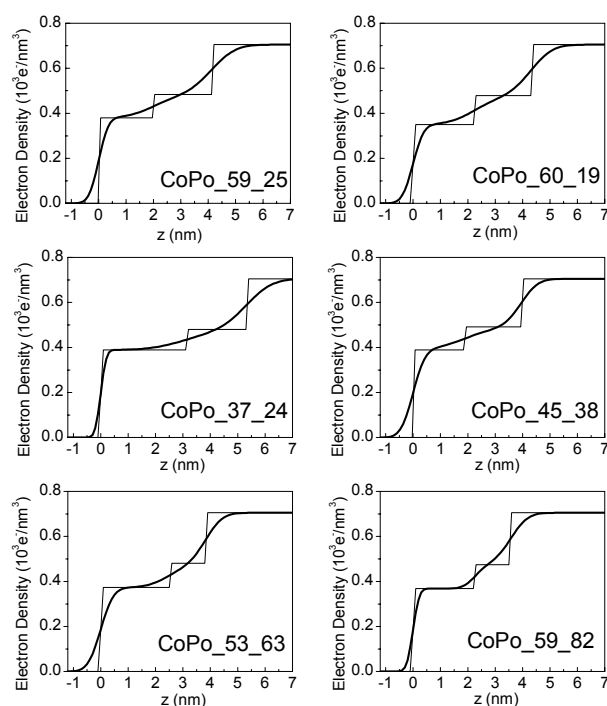
X-ray reflectivity electron density profiles and fit parameters

Figure 2. Electron density profiles corresponding to the two-slab fits for the LB monolayers of PLGA-*b*-PMLGSLGs transferred at 35-45 mN/m on silicon substrates. The smooth curves depict the electron density profiles corresponding to the curve fits, while the step-like curves show the same electron density profiles assuming all interface roughnesses to be equal to zero.

Table 1. Two-slab fit parameters for the X-ray reflectivity curves of the PLGA-*b*-PMLGSLG LB monolayers transferred onto silicon substrates

	CoPo_63_39	CoPo_63_39	CoPo_59_25	CoPo_60_19	CoPo_37_24	CoPo_45_38	CoPo_53_63	CoPo_59_82
	$\pi = 20$ mN/m	$\pi = 40$ mN/m	$\pi = 45$ mN/m	$\pi = 40$ mN/m	$\pi = 45$ mN/m	$\pi = 40$ mN/m	$\pi = 40$ mN/m	$\pi = 35$ mN/m
Layer thickness (nm)								
L ₁ (PLGA)	1.38	1.51	2.11	2.04	2.20	2.03	1.33	1.30
L ₂ (PMLGSLG)	1.88	2.80	2.02	2.27	3.14	1.92	2.53	2.26
Total thickness	3.26	4.31	4.13	4.31	5.34	3.95	3.86	3.56
Electron density ρ_i (10^3 e ⁻ /nm ³)								
ρ_0 (silicon)	0.705 ^a	0.705 ^a	0.705 ^a	0.705 ^a	0.705 ^a	0.705 ^a	0.705 ^a	0.705 ^a
ρ_1 (PLGA)	0.491	0.496	0.483	0.478	0.480	0.492	0.481	0.474
ρ_2 (PMLGSLG)	0.383	0.387	0.380	0.350	0.389	0.389	0.373	0.368
Interface roughness (nm)								
σ_{01} (silicon/PLGA)	0.48 ± 0.04^a	0.48 ± 0.04^a	0.69^b	0.63^b	0.74^b	0.48 ± 0.04^a	0.48 ± 0.04^a	0.48 ± 0.04^a
σ_{12} (PLGA/PMLGSLG)	0.32	0.82	0.76	0.76	0.98	0.89	0.65	0.35
σ_{23} (PMLGSLG/air)	0.49	0.29	0.28	0.31	0.16	0.35	0.37	0.18

^a Values kept fixed for the curve fits.^b σ was first fixed at 0.48 ± 0.04 nm, the average roughness of bare silicon wafers, and the other parameters were varied. Finally σ was varied to obtain the best curve fit.

Table 2 Three-slab fit parameters for the X-ray reflectivity curve of the LB monolayer of CoPo_50_11 transferred onto a silicon substrate at 40 mN/m

Layer thickness (nm)	
L ₁ (PLGA)	5.83
L ₂ (PMLGSLG)	1.56
L ₃ (alkyl chains)	1.37
Total thickness	8.76
Electron density ρ_i (10^3 e ⁻ /nm ³)	
ρ_0 (silicon)	0.705
ρ_1 (PLGA)	0.460
ρ_2 (PMLGSLG)	0.370
ρ_3 (alkyl chains)	0.284
Interface roughness (nm)	
σ_{01} (silicon/PLGA) ^a	1.00
σ_{12} (PLGA/PMLGSLG)	1.65
σ_{23} (PMLGSLG/alkyl chains)	0.95
σ_{34} (alkyl chains/air)	0.28

^a σ was first fixed at 0.48 ± 0.04 nm, the average roughness of bare silicon wafers, and the other parameters were varied, and finally σ was varied to obtain the best curve fit.